

Decoupling FDI from Governance: A Mediation Analysis of the FDI-Economic Performance Relationship in Nigeria's Oil and Gas Industry.

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ABSTRACT

Nigeria's oil and gas sector presents a critical developmental paradox: substantial FDI inflows alongside persistent governance inefficiency and regulatory weaknesses that appear to have undermined sectoral economic performance. There is a dearth of empirical studies on the decomposition of FDI from governance using an appropriate analytical technique for Nigeria's oil and gas industry. This study investigates whether governance quality acts as a mediator in the FDI-economic performance nexus within the industry. It demonstrates that...Devising a three-stage Auto-regressive Distributed Lag (ARDL) mediation framework and the Sobel test on a 51-year longitudinal dataset (1973–2024), the study introduces a novel Oil and Gas Investment Governance Index (OGIGI) to quantify sectoral absorptive capacity. The empirical results demonstrate a significant direct positive relationship between FDI and sectoral output ($\beta = 0.319$, $p = 0.027$), confirming that foreign capital remains a primary driver of sectoral productivity. However, governance quality fails to serve as a transmission mechanism; FDI exerts a negative influence on institutional quality, and the indirect effect remains statistically insignificant ($p \approx 0.54$). These findings highlight a "decoupling" phenomenon, wherein the industry operates as a resource enclave, insulating multinational activities from host-country governance structures. The study concludes that mere investment attraction is insufficient for sustainable development. To convert FDI into institutional gains, Nigerian policymakers must move toward "linkage-based" reforms, integrating FDI with mandatory local content and structured transparency frameworks to ensure that investment drives both productivity and governance strengthening.

Keywords: Foreign Direct Investment, Governance Quality, Mediation Analysis, Oil and Gas Industry, enclave FDI.

JEL Classifications: F21, Q43, Q32, P48.

1.0 INTRODUCTION

With an estimated oil reserve of 37.28 billion barrels, Nigeria's oil and gas industry, unarguably, occupies a position of primacy in the nation's economic ecosystem, with an economy-wide impact in driving government revenue, foreign exchange, employment, export earnings, industrialization, investment flows and GDP growth (Auty, 1993; Watts, 2004; Iledare, 2007; Adenikinju, 2007; Akinlo, 2012, etc.) specifically highlights the significance of the FDI effect of the sector in terms of inflows of foreign resources, such as FDI and portfolio investment, with the bulk of FDI into Nigeria being concentrated in the oil and gas sector.

However, the FDI-economic performance nexus raises important governance issues on the Nigerian economy (Adegboye et al., 2020; Ogundipe et al., 2020). Considering the capital-deficient nature of most oil-dependent economies over time and the benefits accruing from external investors' activities, FDI is recognized as an essential factor in the economic growth trajectory and development outcomes of developing countries. As a result, emphasis and policy efforts have shifted from internal development financing to the integration of developing countries into the global financial architecture by increasing capital inflows through FDI. Thus, FDI is significant because it does more than fill the development financing gap; it also transfers knowledge and technology and integrates the economy globally, among others. However, its effectiveness is conditional, not automatic. Without strong institutions, human capital, and sound policies, FDI may have limited or uneven benefits.

Despite being the nerve-centre of the Nigerian economy, the oil and gas industry has witnessed abysmal performance in recent years in terms of attracting the optimal level of FDI needed to harness the full potential of the sector for sustainable national development. The US Investment Climate Report (US Department of State, 2022) on Nigeria indicates that even though the government undertook sectoral and economy-wide reforms to improve the business environment, FDI inflows nevertheless declined from roughly \$1 billion in 2020 to \$699 million in 2021 as persistent challenges remain. In a specific context, the Nigerian Bureau of Statistics (2023) reports that, for the first time in the nation's history, the oil and gas sector was totally sidelined by foreign investors as FDI in the sector in Q2 2023 fell to zero.

To adduce a reason for the suboptimal performance, the Natural Resources Governance Institute (NRGI) in its 2021 Report has classified governance of oil and gas resources in Nigeria as "poor." This view is buttressed by the Natural Resources Governance Institute's Resource Governance Index (RGI) for 2017, which revealed that "licensing is the weakest link in Nigeria's 'value realization' component, with a score of 17 of 100 points for the policy area, placing it 77th among 89 assessments" (Ajejuni, 2017). The report further indicates that NNPC records a poor governance score of 44 of 100 points, ranking below the sub-Saharan African average for state-owned enterprises (SOEs), despite being the largest SOE on the continent.

As a corollary, there seems to be no consensus among scholars on the actual role of governance in the relationship between FDI and economic performance. Scholars are divided on whether governance is a "mediator" or an 'absorptive capacity' in the FDI-performance nexus. Even though some studies included governance variables as control variables in their econometric models, this inclusion does not position governance as a central mechanism or conditioning factor, thereby underexplaining its true role in shaping economic outcomes through the FDI mechanism. Arising from this loophole, the interactive, complementary and mediating roles of governance in the FDI-economic performance nexus remain insufficiently examined.

Therefore, the objective of this paper is to determine the extent to which governance mediates FDI to shape the economic performance of the oil and gas industry in Nigeria. It attempts to investigate whether governance is not merely a control variable but also a mediator. It argues that governance is the "absorptive capacity" that determines how efficiently FDI inflows are transmitted into positive developmental outcomes. Following this introduction, the rest of the paper is organized as follows: Section 2 discusses the underlying theoretical framework and reviews the existing empirical studies. Methodology was discussed in Section 3, while Section 4 presents and interprets the results of empirical estimation of the econometric models. Section 5 zeroes in on a discussion of the findings with a view to highlighting the "decoupling" phenomenon. Section 6 closes the paper with a conclusion and policy recommendations.

2.0 THEORETICAL FRAMEWORK AND REVIEW OF EMPIRICAL STUDIES

Conceptual Review

The idea of defining governance in terms of the relationship between the state and the non-state actors emerged prominently in the late 20th century, and one of the pioneering schools of thought is the 'Anglo Governance School', pioneered by Rhodes (1996 & 1997) and Rosenau (1992). The kernel of their perspectives is that governance is not only a matter of state hierarchies; it is now becoming a matter of networks, partnerships and interdependence between public, private and voluntary sectors. Rhodes (1999) perceived governance as "governing through networks, blending public, private and voluntary sectors as interdependent actors in policy-making and implementation." The author further defined governance as "self-organizing, inter-organizational networks characterized by interdependence, resource exchange, rules of the game and significant autonomy from the state."

However, Bakare (2014) considers the global institutions' concept of governance by reviewing the World Bank's (1989) definition, given along the line of the good governance and bad governance dichotomy. The author states the institution's definition of good governance as "managing public affairs in a transparent, accountable, participatory and equitable manner. It also involves effective participation in public policy-making, the prevalence of the rule of law and an independent judiciary, institutional checks and balances through horizontal and vertical separation of powers and effective oversight agencies." This view highlights the fact that good governance is an integral element in economic development because it establishes the background of how power is employed to manage the market and determines a nation's social and economic resources for growth and development (World Bank, 1991, 1992).

An important merit of this perspective is the contextual flexibility in light of Nigeria's developmental reality. This definition integrates economic, political, social and environmental dimensions into the conceptualization of governance, making it adaptable to Nigeria's oil and gas sector, the Niger Delta crisis, fluctuating global oil prices, and the green energy transition, all of which require governance frameworks that respond to dynamic challenges. Finally, this view is empirically appealing because it places a high premium on the roles of alliances, cooperation, and stakeholder networks in delivering effective governance and this is relevant to the reality of Nigeria's oil and gas sector, where partnerships between government, multinational corporations, host communities, and global institutions are essential to drive global competitiveness and reduce conflicts.

Similarly, FDI has been defined from diverse perspectives. Golub (2009) defines FDI as “a form of international economic integration that brings gains to both parties according to the principle of comparative advantage”. This view of FDI portrays it as intra-firm trade and transactions in intangible assets such as knowledge and reputation. It is an insightful perspective as it emphasizes the mutual benefits of FDI by associating it with the principle of comparative advantage, which is predicated on efficiency gains and technology transfer and knowledge spillovers. However, this view is defective in the context of the present discourse normative bias and idealistic orientation. The idea that FDI always produces mutual gains does not always hold in situations where power asymmetries, market distortions, and government failures are rife. In developing economies and rentier states that are governance-challenged and institutionally dysfunctional, FDI, rather than engendering all-inclusive development outcomes, may entrench and reinforce dependency or enclave economic structure.

However, Majekodunmi (2026) presented a more contextual definition of FDI to fit the sector-specific of Nigeria’s oil and gas industry and defined “FDI refers to cross-country investments made by a resident (individual, firm, or government) of one economy, known as the FDI-origin country into an enterprise (wholly or partly) in another economy, known as the FDI-destination country, to acquire a lasting interest, usually not less than 10% ownership, and substantial technical and managerial control and decision-making power over the long time in a resource-intensive, strategic sector, such as mining”. In the context of resource-intensive sectors such as oil and gas, which is the major focus of this study, FDI embraces capital inflows, capital expenditure by IOCs, technology transfer, technical and managerial expertise, infrastructure development, and non-equity collaborations, geared toward promoting sustainable resource utilization and economic growth.

Economic performance is a breakdown of how effectively an economy meets key objectives – stability and sustainability through such indicators as GDP growth, employment, inflation control, and income distribution. Sectoral economic performance, which is more relevant to this study, is described as the assessment of the productivity, efficiency, growth, and contributions of a specific sector or industry (oil and gas in this context) to aggregate economic development. The widely used metrics of sectoral economic performance include: output and contribution to GDP, employment generation, investment and FDI inflows, export earnings and foreign exchange, technological transfer and innovation, institutional and governance factors, etc. (Wimalaratana, 2024 and IMF, 2024). Overall, the conceptual review suggests that FDI plays a crucial role in a nation’s economic performance in terms of stimulating important economic indices such as employment generation, technological spillover, financial sector development, sectoral productivity, and human capital development, among others. However, the mediating role of governance as a necessary absorptive capacity of a country is a major determinant of the magnitude and quality of FDI inflow into an economy.

Theoretical Framework

The theoretical framework of this theory is grounded in the complementarity of Institutional Quality Theory and Eclectic/OLI Paradigm. The institutional quality theory has its foundation in new institutional economics (North, 1990; Acemoglu, De Soto, 2000) and Johnson & Robinson, 2001) and it stresses that governance institutions are mediating channels for determining whether resources become a curse or blessing (Acemoglu & Robinson, 2012). Its emergence represents a counter movement and corrective approach to the deterministic resource curse theory and its ascendancy to the mainstream economic paradigm was driven by the observation that some resource-endowed countries flourished with enormous resource

wealth, contrary to the resource curse's postulation (Lederman & Maloney, 2007; Brunnschweiler & Bulte, 2008). Fundamentally, the theory argues that the primary driver of a country's economic performance and developmental outcomes is the quality of its institutions. This theoretical framework suggests that the way and manner a country is governed is far more crucial to its long-term prosperity or stagnation than its available natural resources or physical capital alone. North (1990) defines institutions as "the rules of the game" in a society. The author maintained that institutions provide the incentive structure of an economy and that those structures shape the direction of economic change as they evolve.

In its fundamental form, the institutional quality theory is relevant to this study because it aligns properly with the study's sector-specific focus. A unique feature of the oil and gas industry is its vulnerability to governance failures due to its rent-intensive nature, technical complexity, and strategic importance. Thus, the theory highlights how weak regulatory oversight and poor governance can distort incentives, encourage corruption and rent-seeking, and erode investor confidence, which ultimately undermines both FDI inflows and sectoral performance. This makes the theory particularly suited to analyzing Nigeria's oil and gas industry, where governance shortcomings remain a critical policy constraint.

On the other hand, the eclectic/OLI paradigm is a powerful theoretical groundwork for the present discourse. The Location Theory, commonly referred to as the Ownership, Location and Internalization Paradigm (OLI Framework hereinafter) or the Eclectic Paradigm, is credited to Dunning (1977), with key refinements in 1980, 1988, 1993, 2000 and 2001. At its core, the eclectic paradigm concludes that the level and structure of a firm's foreign value-adding activities will depend on satisfying three conditions: (i) unique and sustainable ownership of specific advantages compared to other firms (Ownership Advantages - "O"); (ii) the extent to which the company perceives it is useful to add to its O advantages rather than to sell them to other foreign firms (Internalization Advantages - "I"); and (iii) the extent to which companies are interested in creating, accessing or utilizing their "O" advantages in a foreign location (Location Advantages - "L"). The combination of these three classes of advantages can be used to analyze the determinants of FDI from the perspectives of location endowments, the level of control over foreign investment, and the types of ownership advantages firms must possess and/or develop to successfully engage in international production.

Essentially, the eclectic/OLI paradigm is highly relevant to this study because FDI inflows in the oil and gas sector is influenced by resource-seeking (location) plus MNC's ownership factors (advanced offshore technology, managerial know-how, etc.), and internalization factors, which explain why international oil companies prefer long-term contractual arrangements such as JVs, PSCs or wholly-owned projects rather than licensing. Dunning (1993) himself admitted that OLI is particularly applicable to natural resource-seeking FDI, making it well-suited for analysing Nigeria's oil and gas sector, which is characterized by location-bound resources, high capital intensity, long-term commitments, and significant political and operational risks. The OLI framework explicitly addresses all these factors.

However, a synthesis of both the institutional quality theory and the eclectic/OLI paradigm has been proposed by scholars as a 'best fit' approach for theoretical analysis of the FDI-performance nexus in relation to the mediatory roles of governance as an important absorptive capacity. Peng (2003, 2009) categorically argued that, in emerging economies, institutional frameworks often override traditional OLI considerations in determining FDI success and, therefore, the OLI framework should be combined with institutional quality theory for greater theoretical flexibility. The argument in favour of the OLI institutional framework has also been advanced by Cuervo-Cazurra & Genc (2008, 2011), who argued

that home and host country institutional quality shape FDI patterns. They further argued that weak and/or ineffective institutions create both constraints and opportunities for MNCs, thereby necessitating an integrated OLI-institutional framework to explain foreign investment in high-corruption environments (Majekodunmi, 2026).

3.3 Review of Empirical Studies

Existing empirical evidence on the FDI-economic performance nexus and the roles of governance quality is diverse and findings suggest that results on the mediating roles of governance in the FDI-performance nexus is mixed, with the majority indicating that the mediating roles of governance seem to be more effective in advanced and developed countries where governance quality is stronger than in the developing resource-dependent economies where governance institutions are weak.

A study by Bonnie et al. (2012) has found a significant nexus between governance quality and FDI to reinforce theoretical postulation. The study utilizes panel data using OLS regression by regressing levels of FDI and FDI volatility on institutional quality (and control variables) using econometric models appropriate for panels. Empirical findings show that strong governance quality matters to FDI and further provide evidence that institutional quality has a positive and significant effect on FDI. The authors concluded that if there are institutional determinants of FDI volatility, and if such volatility is linked to lower economic growth, then the usual policy prescription of attracting FDI into countries by offering the “correct” macroeconomic environment would be ineffective without a commensurate effort on institutional reform.

Similarly, Antonietti & Mondolo (2023) conducted a study to investigate the causal relationship between domestic institutional quality and inward FDI and whether FDI not only depends on good institutions but also influences them, particularly in the short run. Using a sample of 102 countries over 25 years, the study adopted a Panel Vector Autoregression (PVAR) model to test short-run and long-run relationships among variables. Findings show that institutional quality significantly aided FDI attraction, and FDI inflows (mostly Greenfield FDI) have significant short-run effects on governance quality (especially voice and accountability and control of corruption). The study concludes that the relationship between governance/institutions and FDI is bidirectional, suggesting that good institutions not only attract FDI, but FDI (especially greenfield) positively influences institutional quality in the short term.

For the developing countries, Awan et al. (2018) tested the relationships among governance, corruption, and economic performance in five selected SAARC nations (Bangladesh, India, Nepal, Pakistan & Sri Lanka) by conducting a panel regression analysis using a fixed-effects estimation method, based on Hausman specification test results. The results indicated that governance proxied by political stability and government effectiveness has a positive and significant effect on the economic performance of the investigated countries. The study concludes that governance matters and governance indicators (government effectiveness and political stability) have positive and statistically significant effects on economic growth and corruption has an adverse (negative effect) on economic growth in those countries.

Taking it further, Saidi & Ochi (2023) examined the three-pronged relationship between FDI, economic growth, and governance quality for 102 developing countries from 2000 to 2018. The study employed a fixed-effect threshold autoregressive model to determine the optimal level of governance, which, once reached, will trigger the positive impact of FDI on economic growth in developing countries. Governance was measured as the average of six

indicators: control of corruption, government effectiveness, political stability and absence of violence/ terrorism, regulatory quality, rule of law, and voice and accountability. Empirical findings confirm the positive impact of FDI and governance and the negative impact of inflation on growth. The nonlinear effect (threshold autoregressive) showed that, once governance reaches a threshold level of 1.2, the positive effect(s) of FDI would begin to manifest. The study concludes that the relationship between FDI, economic growth, and governance quality is nonlinear and there is a threshold level of governance quality below which FDI inflows do not have a significant positive effect on growth.

Studies on the tripartite relationships between FDI, governance and economic performance are well cited in the literature and evidence suggest that results is inconclusive on the mediating roles of governance in the FDI-performance interaction. For instance, Ozegbe and Salami (2023) investigated the interaction effects of FDI and governance on the growth of the Nigerian economy. Utilizing a multiple regression method with an Autoregressive Distribution Lag (ADRL) approach, the study established that changes in FDI and governance exert positive and highly significant effects on economic performance, suggesting that economic agents and institutions operate at optimal capacity, while the interaction between governance and FDI also exerts a positive and highly significant impact on economic performance. The empirical findings indicate that governance is a significant moderating factor between FDI and economic performance in Nigeria. The study concludes that economic performance responds positively and significantly to the changes in the interaction between governance and FDI on a long-run basis

However, the review of empirical studies shows a lack of sector-specific analysis in the previous FDI-governance and economic performance studies. Most existing studies direct their analysis to the economy-wide or other sectors (manufacturing, finance, etc.), ignoring the strategic importance of the oil and gas industry. This is a huge contextual gap because there is no empirical research in Nigeria and Sub-Saharan Africa specifically examining the mediatory roles of governance on FDI in oil and gas industry and this study bridges the gap by offering sector-specific analysis within the Nigerian oil and gas industry. Moreso, the reviews show that there is a paucity of recent empirical evidence that accurately captures the changing conditions of Nigeria's oil and gas sector, especially the ongoing reforms, shifts in global energy markets, the global geopolitical tensions, and changes in governance frameworks. Many past studies rely on outdated data, which limits their relevance for current policy discourse.

3.0 METHODOLOGY

Model Specification

The objective of this paper is to analyze the mediation effects of governance and FDI on the economic performance of Nigeria's oil and gas industry. The functional equation establishes the linkage between FDI and sectoral output (economic performance):

$$GDP_t = f(FDI_t, OGIGI_t, MAC_t \text{ and } Z_t) \quad (1)$$

Equation 1 specifies the functional relationship between economic performance and FDI inflows, where GDP_t represents the real gross domestic product of Nigeria's oil and gas sector (the share of the oil and gas sector in overall GDP) at the time t , serving as the dependent variable. The explanatory variables include FDI_t (foreign direct investment inflows into the

oil and gas sector), MAC_t (macroeconomic fundamentals such as exchange), $OGIGI_t$ (governance proxy) and Z_t (a vector of relevant control variables such as trade openness and government expenditure). OGIGI is Oil and Gas Governance and Investment Index and it was constructed as a composite indicator combining capital importation and upstream capital expenditure using a weighted aggregation approach. This approach is consistent with established index number and composite indicator theory (Booyesen, 2002; Nardo et al., 2005; Land, 2021).

In the context of this study, the OGIGI is constructed to measure the efficiency with which foreign capital inflow into Nigeria's oil and gas industry are converted into upstream productive investment and it is derived as the ratio of upstream capital expenditure to capital importation into the sector, capturing the ability of national institutions to transform external resources into tangible sectoral outcomes.

The general functional form of the index is specified as:

$$OGIGI_t = w_1 CI_t + w_2 UCE_t \quad (2)$$

where $OGIGI_t$ represents the Oil and Gas Investment Index at time t , CI_t denotes capital importation, UCE_t represents upstream capital expenditure, and w_1 and w_2 are weights such that $w_1 + w_2 = 1$.

Following standard practice in composite index construction, weights were assigned based on the relative importance of each component. Upstream capital expenditure was given a higher weight because it directly reflects productive investment in exploration and production activities, while capital importation captures external financing inflows. Thus, the operational form of the index is expressed as:

$$OGIGI_t = 0.4(CI_t) + 0.6(UCE_t) \quad (3)$$

To ensure comparability and avoid scale distortion, the variables were transformed into ratio form before aggregation. This is consistent with methodological recommendations in the literature, which emphasize normalization as a necessary step in composite index construction to ensure that variables measured in different units can be meaningfully combined (Greco et al., 2019; OECD et al., 2008). The normalized specification is given as:

$$OGIGI_t = 0.4 \left(\frac{CI_t}{CI_{base}} \right) + 0.6 \left(\frac{UCE_t}{UCE_{base}} \right) \quad (4)$$

This formulation produces a ratio-based composite index that captures relative changes in investment intensity over time. Contemporary methodological studies further confirm that such aggregation approaches are appropriate for long time series analysis, particularly in macroeconomic and sectoral investment studies where structural changes occur over time (Land, 2021; Mazziotta & Pareto, 2024).

To capture the multifaceted determinants of GDP through FDI inflows while explicitly accounting for macroeconomic conditions, governance quality and sector-specific dynamics, the baseline model was formulated thus:

$$GDPog_t = \alpha_0 + \alpha_1 FDI_t + \alpha_2 GDP_t + \alpha_3 TOP_t + \alpha_4 OGIGI_t + \alpha_5 (OGIGI_t * FDI_t) + \alpha_6 PETAX_t + \epsilon_t \quad (5)$$

In this model, $GDPog_{it}$ represents the oil and gas real gross domestic product, capturing its sector-specific economic performance. At the same time, FDI_{it} denotes foreign direct investment inflows into the oil and gas sector, which is expected to influence oil and gas GDP positively ($\alpha_1 > 0$) through increased production, capital formation, knowledge spillover, and human capital development. Macroeconomic controls include GDP_t (market size), and TOP_t (trade openness), with larger economies ($\alpha_2 > 0$) and more open trade ($\alpha_3 > 0$) enhancing investment efficiency and market access. Governance factor, $OGIGI_t$ ($OGIGI_t$, which measures the efficiency with which foreign capital inflow into Nigeria's oil and gas industry are converted into upstream productive investment) ($\alpha_4 > 0$) improves investor confidence.

In a similar vein, the interaction term, $OGIGI_t * FDI_t$ measure how governance moderates the influence of FDI on economic performance. It is expected that when oil revenue losses are low and governance is effective, FDI amplifies sectoral output performance through improved technology, capital intensity, and managerial efficiency, implying that oil revenue loss moderates (dampens) the FDI-output relationship. So, it is expected that ($\alpha_5 > 0$), indicating a positive relationship. $PETAX_t$ (petroleum tax rate) captures the fiscal policy incentive in the industry and it is expected to be positively related to the GDP performance because tax incentives shape investment attractiveness by reducing operational barriers and improving profitability. Thus, α_6 is predicted to be $\alpha_6 > 0$. The stochastic error term, ϵ_t , accounts for unobserved influences. Together, these variables combine to form a comprehensive model and robust framework for assessing how governance mediates FDI to influence the economic performance of the oil and gas industry in terms of its contribution to Nigeria's overall GDP.

Table 3.1: Data Source, Measurement and Definition of Variables

Data	Identifier/Abbreviation	Sources	Definition	Measurement
FDI inflows into the oil and gas industry.	FDIog	NNPC, NBS, CBN	Monetary values of FDI inflows into Nigeria's oil and gas industry over time.	Net oil and gas FDI inflows in US dollars or as a % of GDP in constant US Dollars.
Oil and Gas Gross Domestic Product	GDPog	CBN, NBS.	Composite or individual indicators; annual time series	Percentage Share of Oil and Gas Sector in aggregate GDP
Oil and Gas Investment Governance Index	OGIGI	Constructed by the author	The efficiency with which foreign capital inflows into Nigeria's oil and gas sector are converted into upstream productive investments.	Ratio of upstream capital expenditure to capital importation into the sector.
Gross Domestic Product	GDP	WDI, CBN	Annual percentage change in real GDP measured at constant prices to control for inflation effects.	Monetary value of GDP measured in constant naira term, adjusted for inflation to capture changes in real economic output over time.
Trade Openness	TOP	CBN	The degree to which Nigeria's oil and gas industry is integrated into the global economy through the import and export of crude oil and gas and the overall exposure of the sector to international trade and capital flows	Ratio of the sum of total exports and total imports to GDP, capturing the degree of Nigeria's integration into the global economy.
Petroleum Tax	PETAX	CBN	Fiscal charges imposed by the government that are payable on profits, production, or operations of firms operating in Nigeria's oil and gas industry	Total government revenue from petroleum-related taxes, expressed as a percentage of GDP.
Interaction between FDI and Governance	OGIGI × FDI	Constructed by the author	Product of normalized FDI and GOV values	Constructed by the author*** Edit!

Source: Authors' Compilation (2026).

Model Estimation Technique

The Auto-regressive Distributed Lag (ARDL) bounds testing approach was selected as the main model estimation technique for the study because the variables exhibit mixed orders of integration (I(0) and I(1)), even after controlling for structural breaks. This mixed-order integration supports the use of the Autoregressive Distributed Lag bounds testing framework for subsequent analysis. This approach allows for the simultaneous estimation of long-run

relationships and short-run adjustments. To enhance the methodological robustness of the model estimation, the Direct and Indirect Mediation effects framework was utilized to estimate the models.

Instructively, the direct and indirect mediation analysis was introduced in the econometric analytical framework to determine whether the effect of FDI (independent variables) on economic performance (dependent variable) occurs directly or indirectly through a third variable (governance). This first step establishes whether FDI significantly influences the economic performance of Nigeria's oil and gas industry before introducing governance as a potential transmission mechanism. The second stage of the mediation analysis examines the influence of FDI on governance. The analysis estimates the magnitude and significance of the indirect effect of FDI on sectoral growth via improvements in governance quality. The Sobel test was introduced into the model estimation to statistically verify whether governance mediates the relationship between FDI and economic performance in Nigeria's oil and gas industry. Given that Path a: FDI → Governance and Path b: Governance → Economic Performance, the Sobel test combines a and b to determine whether the indirect (mediated) effect ($a \times b$) is statistically significant.

4.0 EMPIRICAL RESULTS

Stationarity Tests

The stationarity properties of all macroeconomic series were assessed using three complementary unit root tests: Augmented Dickey-Fuller (ADF), Phillips-Perron (PP), and Zivot-Andrews (1992), the latter to account for potential structural breaks. These tests were applied to determine whether the variables are stationary in levels or require first differencing to achieve stationarity. This test is necessary to avoid misleading regression results that may arise where the data exhibit non-stationarity (Hamilton, 1994). Table 2 presents the results for both levels and first differences.

Table 2: Augmented Dickey–Fuller (ADF) Unit Root Test Results

Variable	Levels ADF Statistic	Levels p- value	First Difference ADF Statistic	First Difference p-value	Order of Integration
LFDI	-0.711	0.8339	-6.941***	0.0000	I(1)
LGDPOG	-3.931**	0.0036	-	-	I(0)
LINFR	-4.569***	0.0005	-	-	I(0)
PETAX	-3.196*	0.0260	-	-	I(0)
LOGIGI	-0.339	0.9109	-3.615*	0.0287	I(1)
LTOP	-0.991	0.7497	-6.810***	0.0000	I(1)
LOILR	-0.183	0.9338	-5.224***	0.0001	I(1)
LEXR	0.077	0.9609	-5.236***	0.0001	I(1)
LGCOP	-2.834	0.0607	-8.872***	0.0000	I(1)
LGDP	-2.423	0.1407	-7.174***	0.0000	I(1)

NOTE: ADF = Augmented Dickey–Fuller test statistic; levels and first differences represent the original series and its first-differenced form, respectively. ** and *** denote significance at the 5% and 1% levels, respectively. I(0) indicates stationarity at levels, while I(1) indicates stationarity after first differencing.

Source: Researcher's computation based on regression results (2026).

Table 2 presents the results of the Augmented Dickey–Fuller (ADF) unit root tests conducted to assess the stationarity properties of the key macroeconomic variables used in this study. Stationarity is a critical precondition for time-series econometric analysis, as non-stationary data can lead to spurious regression results (Gujarati & Porter, 2021). The table reports ADF

statistics and corresponding p-values for both the level and first-differenced series, alongside the determined order of integration for each variable.

The results indicate a mixed pattern of stationarity across the variables. Specifically, LFDI is non-stationary at levels, as evidenced by the low magnitude of the ADF statistics (-0.711 and -0.873, respectively) and high p-values (0.8339 and 0.7889), failing to reject the null hypothesis of a unit root. However, the series becomes stationary after first differencing, with highly significant ADF statistics (-6.941, $p < 0.01$), indicating they are integrated of order one, I(1). A similar pattern is observed for other key variables: LOGIGI, LTOP, LOILR, LEXR, LGCOP, and LGDP, all of which require first differencing to achieve stationarity. These results suggest that most macroeconomic and financial indicators in the Nigerian context exhibit stochastic trends over the sample period, consistent with previous studies on resource-dependent economies (Akinbobola, 2019; Uzonwanne, 2020).

Conversely, LGDPOG, LINFR, and LPETAX display stationarity at levels, with ADF statistics of -3.931, -4.569, and -3.196, and p-values of 0.0036, 0.0005, and 0.0260, respectively, allowing rejection of the unit root null hypothesis at conventional significance levels. This indicates that these series are mean-reverting and do not require differencing for subsequent analysis, implying that fluctuations in oil and gas GDP contribution, inflation, and petroleum tax revenues tend to stabilize around a deterministic trend. Overall, the findings establish a clear distinction between I(0) and I(1) variables, providing a rigorous foundation for the multivariate analyses and cointegration modelling undertaken in subsequent chapters.

Table 3: Breakpoint Unit Root Test Results

Variable	ADF t Statistic	Prob.	5% Critical Value	Order of Integration
LFDI	-2.053856	0.9794	-4.443649	I(1)
LGDPOG	-4.948534	0.0100	-4.443649	I(0)
LINFR	-5.700543	<0.01	-4.443649	I(0)
LPETAX	-12.98656	<0.01	-4.443649	I(0)
LOGIGI	-1.282452	>0.99	-4.443649	I(1)
LTOP	-2.304708	0.9457	-4.443649	I(1)
LOILR	-7.044114	<0.01	-4.443649	I(0)
LEXR	-2.489158	0.9056	-4.443649	I(1)
LGCOP	-4.516424	0.0413	-4.443649	I(0)
LGDP	-10.90782	<0.01	-4.443649	I(0)

NOTE: Break dates are selected by minimizing the Dickey-Fuller t-statistic under the innovational outlier specification with intercept only. Critical values follow Vogelsang 1993 asymptotic one-sided probabilities. I(0) denotes stationarity at levels, while I(1) denotes stationarity after first differencing.

Source: Researcher's computation based on Regression Results (2026).

The breakpoint unit root test based on the innovational outlier framework was employed to account for possible endogenous structural changes in the series, recognising that ignoring such breaks may distort conventional unit root inference. The procedure determines the break date by minimising the Dickey-Fuller t-statistic and evaluates stationarity in the presence of a one-time shift in the intercept. The results presented in Table3 indicate mixed integration properties across the variables.

At the 5 percent significance level, the null hypothesis of a unit root cannot be rejected for Log of Foreign Direct Investment LFDI with ADF statistic -2.053856 and probability 0.9794, Oil and Gas Investment Governance Index LOGIGI with statistic -1.282452 and probability greater than 0.99, Log of Trade Openness LTOP with statistic -2.304708 and

probability 0.9457, and Log of Exchange Rate LEXR with statistic -2.489158 and probability 0.9056. In each case, the test statistics are less negative than the five percent critical value of -4.443649 , indicating non-stationarity at levels. These variables, therefore, become stationary only after first differencing and are classified as integrated of order one, $I(1)$.

Conversely, Log of GDP from Oil and Gas LGDPOG with statistic -4.948534 and probability 0.0100, Log of Inflation LINFR with statistic -5.700543 and probability less than 0.01, Petroleum Tax LPETAX with statistic -12.98656 and probability less than 0.01, Oil Rent LOILR with statistic -7.044114 and probability less than 0.01, Log of Global Crude Oil Price LGCOP with statistic -4.516424 and probability 0.0413, and Log of Gross Domestic Product LGDP with statistic -10.90782 and probability less than 0.01 reject the null hypothesis of a unit root. Their test statistics are more negative than the five percent critical value, confirming stationarity at levels.

Summarily, the findings reveal the presence of both $I(0)$ and $I(1)$ variables even after controlling for structural breaks. This mixed order of integration supports the use of the Autoregressive Distributed Lag bounds testing framework for subsequent analysis

This section examines whether governance quality, as measured by the Oil and Gas Investment Governance Index (OGIGI), transmits the effect of FDI in the oil and gas sector (FDIog) on economic performance measured by sectoral output (LGDPog). Mediation analysis allows researchers to determine whether an independent variable influences a dependent variable directly or indirectly through a third variable (Baron & Kenny, 1986 and Hayes, 2013).

Cointegration Analysis

Having established the presence of a mixture of $I(0)$ and $I(1)$ variables as reported in Table 4, the current study proceeds to examine the existence of a stable long-run relationship using the autoregressive distributed lag bounds testing approach.

Table 4: ARDL Bound Test Results

Sample Size	10%		5%		1%	
	$I(0)$	$I(1)$	$I(0)$	$I(1)$	$I(0)$	$I(1)$
			F-Statistic:4.9670			
45	2.327	3.541	2.764	4.123	3.790	5.411
50	2.309	3.507	2.726	4.057	3.656	5.331
Asymptotic	2.120	3.230	2.450	3.610	3.150	4.430
			t-Statistic:-4.9754			
Asymptotic	-2.570	-4.040	-2.860	-4.380	-3.430	-4.990

NOTES: $I(0)$ and $I(1)$ represent lower and upper critical bounds for the ARDL bounds test, corresponding to stationary and non-stationary series. The F-statistic and t-statistic are calculated to test the null hypothesis of no long-run relationship. Trend type for all models: Unrestricted constant (Case 3). Sample size corresponds to the number of observations used in the ARDL estimation.

Source: Researcher's computation based on regression results(2026).

The ARDL bounds test results in Table 4 indicate the presence of a long-run relationship among the variables. The computed F statistic of 4.9670 exceeds the upper $I(1)$ critical bounds at the ten percent level, which is 3.541, and at the five percent level, which is 4.123, for the relevant small sample size, although it is slightly below the one percent upper bound of 5.411. In addition, the t-statistic of -4.9754 is greater in absolute terms than the upper

asymptotic critical values at the ten percent and five percent levels and is very close to the one percent threshold. Since both test statistics lie above the respective upper bounds at conventional significance levels, the null hypothesis of no long-run relationship is rejected, confirming the existence of cointegration and supporting the estimation and interpretation of the long-run coefficients in the model.

Lag Length Criteria

The lag length selection criteria for the model are tabulated below:

Table 5: VAR Lag Order Selection Criteria

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-138.2260	NA	0.000100	6.051085	6.323969	6.154208
1	159.9229	496.9149	0.000317*	-4.330121	-2.147053*	-3.505136*
2	193.6934	46.43439	0.000682	-3.695557	0.397695	-2.148711
3	234.8543	44.59102	0.000136	-3.368929	2.634507	-1.100222
4	335.3195	79.53496*	0.000362	-5.513313*	2.400308	-2.522744

NOTES: LR = Likelihood Ratio; FPE = Final Prediction Error; AIC = Akaike Information Criterion; SC = Schwarz Criterion; HQ = Hannan-Quinn Criterion. * indicates the lag order selected by the respective criterion.

Source: Researcher's computation based on regression results(2026).

Table 5 reports the VAR lag order selection criteria used to guide the model specification. The evidence from the majority of the information criteria points to an optimal lag length of 4periods. In view of this, a maximum lag of two is retained for the parsimonious specification of the model, striking a careful balance between capturing the essential dynamic structure and avoiding unnecessary loss of degrees of freedom.

Dynamic ARDL Total Effect Estimation

To test the mediating role of governance in the relationship between FDI and economic performance, the analysis began by estimating the total effect of FDI using the autoregressive distributed lag framework. Figure 1 illustrates the relationship.

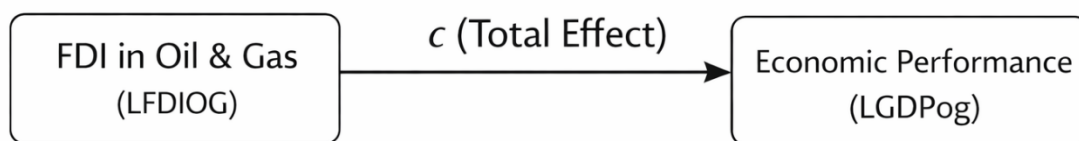


Figure 1: Direct Effect Model

Source: Researcher's computation based on regression results (2026).

This first step establishes whether foreign direct investment significantly influences the economic performance of Nigeria's oil and gas industry before introducing governance as a potential transmission mechanism.

Table 4: Summary of ARDL Direct Effect Mediation Estimates – Dependent Variable: LGDPog

Variable	Coefficient	Std. Error	t Statistic	Prob.
Long Run Coefficients				
LFDI OG	0.181700	0.054355	3.342826	0.0017
LEXR(-1)	0.213325	0.207840	1.026391	0.3104
LGDP(-1)	-0.301369	0.189893	-1.587050	0.1198
LTOP(-1)	-0.018609	0.174983	-0.106350	0.9158
LPETAX(-1)	-0.044651	0.067466	-0.661828	0.5116
Short Run Dynamics				
ECM(-1)	-0.698062	0.108281	-6.446753	0.0000
D(LEXR)	-0.058105	0.142478	-0.407815	0.6858
D(LEXR(-1))	0.359022	0.160127	2.242111	0.0312
D(LGDP)	0.053367	0.143852	0.370988	0.7128
D(LGDP(-1))	-0.005599	0.152943	-0.036607	0.9710
D(LGDP(-2))	0.479892	0.139130	3.449231	0.0015
D(LGDP(-3))	0.104728	0.052030	2.012853	0.0517
D(LTOP)	0.376472	0.133036	2.829850	0.0076
D(LTOP(-1))	0.194640	0.142382	1.367030	0.1801
D(LTOP(-2))	0.411712	0.131888	3.121670	0.0035
D(LPETAX)	0.160264	0.047849	3.349342	0.0019
C	1.649073	0.269273	6.124173	0.0000
R squared	0.833492			
Adjusted R squared	0.782615			
F statistic	16.38237			
Prob F statistic	0.000000			
Durbin Watson stat	2.056834			

Source: Researcher's computation based on regression results(2026).

Table 4 presents the ARDL direct effect estimates for the mediation analysis in which oil and gas sector economic performance, proxied by LGDPog, is the dependent variable. The model demonstrates strong explanatory power, with an R-squared of 0.833, indicating that approximately 83 percent of the variation in sectoral output (economic performance) is explained by the included regressors. The F-statistic is statistically significant at the one percent level ($F = 16.382$, $p = 0.000$), confirming the overall robustness of the specification. The Durbin-Watson statistic of 2.057 suggests the absence of serial correlation, thereby supporting the reliability of the estimated coefficients.

In the long run, oil and gas FDI exerts a positive and statistically significant effect on economic performance ($\beta = 0.182$, $p = 0.002$). This implies that sustained increases in FDI are associated with higher sectoral output in the sector, underscoring the structural importance of external capital inflows in enhancing productive capacity and technological advancement within the sector. By contrast, the exchange rate, aggregate GDP, trade openness, and petroleum taxation are statistically insignificant in the long run (LEXR $\beta = 0.213$, $p = 0.310$; LGDP $\beta = -0.301$, $p = 0.120$; LTOP $\beta = -0.019$, $p = 0.916$; LPETAX $\beta = -0.045$, $p = 0.512$). Although some variables display expected signs, their insignificance suggests that they do not exert a persistent independent influence on oil and gas performance once FDI is controlled for in the direct effect model.

The short-run dynamics confirm the existence of a stable long-run equilibrium relationship. The error correction term is negative and highly significant ($\beta = -0.698$, $p = 0.000$), indicating that approximately 70 percent of short-run disequilibrium is corrected within one period. This reflects a relatively rapid adjustment process following shocks to the system.

In the short run, exchange rate movements exhibit a delayed positive effect on sectoral output, as the first lag of exchange rate changes is significant ($\beta = 0.359$, $p = 0.031$), while the contemporaneous effect remains insignificant. Aggregate economic activity also shows dynamic influence, with the second lag of GDP growth positively and significantly affecting oil and gas performance ($\beta = 0.480$, $p = 0.002$). Trade openness demonstrates positive and significant short-run effects both contemporaneously and at the second lag ($\beta = 0.376$, $p = 0.008$; $\beta = 0.412$, $p = 0.004$), suggesting that increased integration into global markets stimulates immediate sectoral expansion. Petroleum taxation is likewise positive and significant in the short run ($\beta = 0.160$, $p = 0.002$), indicating that fiscal adjustments may coincide with improved sectoral output, potentially reflecting strengthened institutional or revenue frameworks.

By and large, the results show that FDI constitutes the primary long-run driver of economic performance in the oil and gas sector, while exchange rate dynamics, trade openness, aggregate output, and petroleum taxation operate largely through short-run adjustment mechanisms. The significant and sizeable error correction coefficient further confirms the stability and convergence of the system toward the long-run equilibrium.

Effect of Independent Variables on the Mediator

The second stage of the mediation analysis examines the influence of oil and gas FDI (LFDIog) on the Oil and Gas Investment Governance Index (LOGIGI). The analysis estimates the magnitude and significance of the indirect effect of FDI on sectoral growth via improvements in governance quality or changes in governance. Figure 2 illustrates this relationship, highlighting the mediating role of Governance Index in the oil and gas sector.

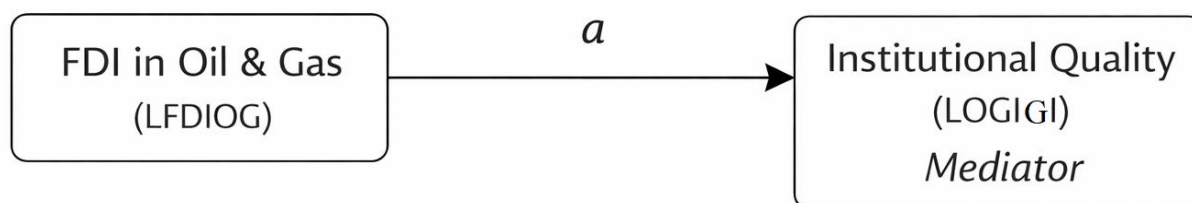


Figure 2: Indirect path (Mediator Model)

Source: Researcher's computation based on regression results(2026).

The indirect path stage examines how FDI in the oil and gas sector (LFDIog) influences institutional quality (LOGIGI), which serves as the mediator between FDI and sectoral economic performance.

Table 5: ARDL Indirect Path Estimates – Dependent Variable: LOGIGI

Variable	Coefficient	Std. Error	t-Statistic	Prob.
Long run Coefficients				
LFDIOG(-1)	-0.739561	0.161314	-4.584594	0.0000
LINFR	0.006583	0.111362	0.059110	0.9531
LEXR	0.290723	0.063856	4.552796	0.0000
LGDPPOG	0.258484	0.243386	1.062037	0.2939
LTOP(-1)	-0.103052	0.077357	-1.332164	0.1895
Short run Dynamics				
ECM(-1)*	-0.501671	0.115946	-4.326749	0.0001
D(LOGIGI(-1))	0.657068	0.138001	4.761323	0.0000
D(LFDIOG)	-0.788554	0.081182	-9.713459	0.0000
D(LFDIOG(-1))	0.337200	0.129118	2.611570	0.0123
D(LTOP)	-0.140336	0.040296	-3.482649	0.0011
C	0.991319	0.226053	4.385340	0.0001
R-squared	0.731210			
Adjusted R-squared	0.700666			
F-statistic	23.93930			
Prob(F-statistic)	0.000000			
Durbin-Watson stat	2.133871			

Source: Researcher's computation based on regression results(2026).

Table 5 presents the ARDL estimates for the indirect path stage of the mediation analysis, with governance/institutional quality (LOGIGI) serving as the mediator. The model demonstrates robust explanatory power, with an R-squared of 0.731, indicating that roughly 73 percent of the variation in governance is accounted for by the regressors. The F-statistic is highly significant ($F = 23.939$, $p = 0.000$), confirming the robustness of the specification, while the Durbin-Watson statistic of 2.134 suggests the absence of serial correlation.

In the long run, oil and gas FDI (LFDIog) exerts a negative and statistically significant effect on institutional quality ($\beta = -0.740$, $p = 0.000$). This indicates that sustained increases in FDI may challenge governance structures, suggesting that the indirect effect of FDI on economic performance through institutional quality could be detrimental if governance mechanisms are weak and ineffective. Exchange rate stability (LEXR) positively influences institutional quality ($\beta = 0.291$, $p = 0.000$), highlighting the potential role of favourable macroeconomic conditions in strengthening governance. Inflation (LINFL), sectoral output (LGDPog), and trade openness (LTOP(-1)) are statistically insignificant in the long run, implying that these factors do not substantially modify the mediator over time.

The short-run dynamics reveal that changes in FDI have a strong negative impact on governance quality ($D(LFDIOG) \beta = -0.789$, $p = 0.000$), while the first lag partially offsets this effect ($D(LFDIOG(-1)) \beta = 0.337$, $p = 0.012$). Trade openness also negatively affects governance in the short run ($D(LTOP) \beta = -0.140$, $p = 0.001$), indicating that rapid adjustments in trade policies may pose temporary stress on institutional frameworks. The lagged level of governance quality ($D(LOGIGI(-1)) \beta = 0.657$, $p = 0.000$) is positive and significant, reflecting persistence and inertia in governance structures. The error correction term ($ECM(-1) \beta = -0.502$, $p = 0.000$) confirms that deviations from long-run equilibrium in governance quality are corrected at a moderate pace, implying a stable dynamic relationship.

In mediation terms, these results indicate that FDI indirectly influences oil and gas sector performance through governance quality. The negative long-run and short-run effects of FDI on LOGIGI suggest a potentially adverse indirect pathway. This outcome implies that without

strengthening governance through effective institutions, FDI may not fully translate into improved economic performance in the oil and gas industry. On the contrary, positive effects of the exchange rate point to the importance of macroeconomic stability in enhancing the mediator and thereby supporting more effective indirect contributions to economic performance.

Direct and Mediated Effects

In the third stage of the mediation analysis, oil and gas sector economic performance (LGDPog) was regressed on both FDI (LFDIOg) and governance quality (LOGIGI). This stage estimates the direct effect of FDI on sectoral economic performance while accounting for the mediator, as well as the influence of governance itself on economic performance. The relations are illustrated in Figure3.

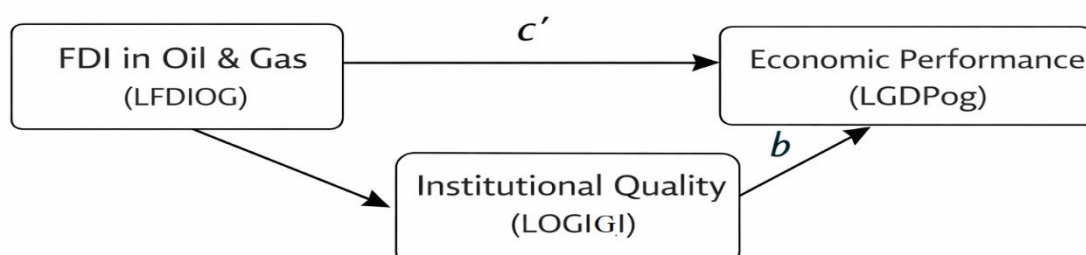


Figure 3: Direct and Indirect Effects Model

Source: Researcher's computation based on regression results (2026).

Table 6: Dynamic ARDL Mediation Estimates – Dependent Variable: LGDPog

Variable *	Coefficient	Std. Error	t-Statistic	Prob.
Long run Coefficient				
LOGIGI	0.118945	0.191534	0.621011	0.5378
LFDIOG	0.319236	0.139408	2.289936	0.0269
LINFR(-1)	0.295265	0.129083	2.287394	0.0270
LEXR(-1)	-0.106191	0.083934	-1.265179	0.2125
LPETAX(-1)	-0.070721	0.059045	-1.197745	0.2374
LTOP(-1)	0.216703	0.050064	4.328509	0.0001
Short run Dynamics				
ECM(-1)*	-0.730077	0.088990	-8.204032	0.0000
D(LINFR)	0.054404	0.065531	0.830195	0.4111
D(LEXR)	-0.027879	0.141902	-0.196467	0.8452
D(LEXR(-1))	0.396610	0.153639	2.581446	0.0134
D(LPETAX)	0.146610	0.048524	3.021365	0.0043
D(LTOP)	0.322445	0.048165	6.694603	0.0000
D(LTOP(-1))	0.210829	0.050547	4.170938	0.0001
C	0.184279	0.036299	5.076758	0.0000
R-squared	0.790841			
Adjusted R-squared	0.755982			
F-statistic	22.68636			
Prob (F-statistic)	0.000000			
Durbin-Watson stat	1.986027			

Source: Author's computation based on regression results (2026).

Table 6 presents the dynamic ARDL estimates examining the relationship between FDI in the oil and gas sector, governance quality (LOGIQI) as a proposed mediator, and sectoral economic performance (LGDPog) as the dependent variable. The model demonstrates robust explanatory power, with an R^2 of 0.791 and a highly significant F-statistic ($F = 22.686$, $p < 0.001$), indicating that the regressors collectively account for a substantial portion of the variation in oil and gas sector output. The Durbin-Watson statistic of 1.986 suggests the absence of serious serial correlation, supporting the reliability of the estimated coefficients. In the long run, FDI exhibits a positive and statistically significant effect on sectoral output ($\beta = 0.319$, $p = 0.027$), consistent with literature showing that capital inflows, technology transfer, and productivity spillovers from FDI enhance economic performance in resource-dependent sectors (Oyefabi et al., 2021 and Ozegbe & Salami, 2023). In contrast, governance quality displays a positive but statistically insignificant effect on output ($\beta = 0.119$, $p = 0.538$), indicating that governance alone does not independently drive long-run growth in the oil and gas sector.

Relatedly, the Stage Two analysis confirms that FDI significantly affects governance quality, and it implies that FDI contributes to improvements in governance structures and institutional framework. However, because the relationship between LOGIQI and economic performance in Stage Three is not significant, the computed indirect effect of FDI through governance quality ($a \times b$) is also insignificant (Sobel $z = -0.615$, $p \approx 0.54$). These findings indicate that governance does not statistically mediate the effect of FDI on economic performance. Therefore, despite FDI improving institutional quality, the transmission pathway through governance is not empirically supported. This pattern is attributable to weak institutional capacity, in which institutions lack the capacity to effectively regulate FDI and enforce contract and property rights laws (Rodrik, 2008 and Acemoglu & Robinson, 2012) and also to the resource-curse dynamics associated with rentier-states in which institutional accountability and transparency are weakened, leading to a whittling down of the development impact of FDI (Auty, 1993 and Sachs & Warner, 2001).

The short-run dynamics are characterized by a negative and significant error correction term (ECM(-1) $\beta = -0.730$, $p < 0.001$), suggesting that approximately 73% of deviations from long-run equilibrium are corrected within one period. Contemporaneous and lagged changes in trade openness (LTOP) and petroleum taxation (LPETAX) exhibit significant positive effects on output, while exchange rate movements influence sectoral performance at the first lag. These patterns reflect the adjustment dynamics typical of ARDL specifications and underscore the responsiveness of the oil and gas sector to macroeconomic and policy changes (Husnain et al., 2023).

Overall, the empirical evidence demonstrates that FDI exerts a significant direct influence on Nigeria's oil and gas economic performance, whereas governance quality does not transmit this effect. Consequently, the study concludes that the FDI-governance mediation pathway is not supported: governance does not act as a statistically significant conduit through which foreign (FDI) investment affects sectoral output (economic performance). The results emphasize that the primary channel of FDI's impact operates directly rather than indirectly through institutional/governance mechanisms.

Indirect Effect and Sobel Test

To determine whether governance transmits the effect of FDI on oil and gas sector's economic performance, the indirect effect was previously tested using the Sobel procedure. While the magnitude of the indirect coefficient is obtained by multiplying the path coefficients, statistical significance requires a standard error-based computation.

From the long-run ARDL estimates, the coefficient of FDI on governance was -0.739561 with a standard error of 0.161314 . The coefficient of governance quality on oil and gas output was 0.118945 with a standard error of 0.191534 . Therefore, the indirect effect was computed as follows:

$$ab = (-0.739561 \times 0.118945) = -0.08796 \quad (6)$$

The Sobel standard error was calculated using:

$$SE_{ab} = \sqrt{(b^2sa^2 + a^2sb^2)} \quad (7)$$

Substituting the estimated values produced a standard error of 0.14296 .

The Sobel test statistic was therefore:

$$z = -0.08796 / 0.14296 = -0.615 \quad (8)$$

The corresponding probability value is approximately 0.54 .

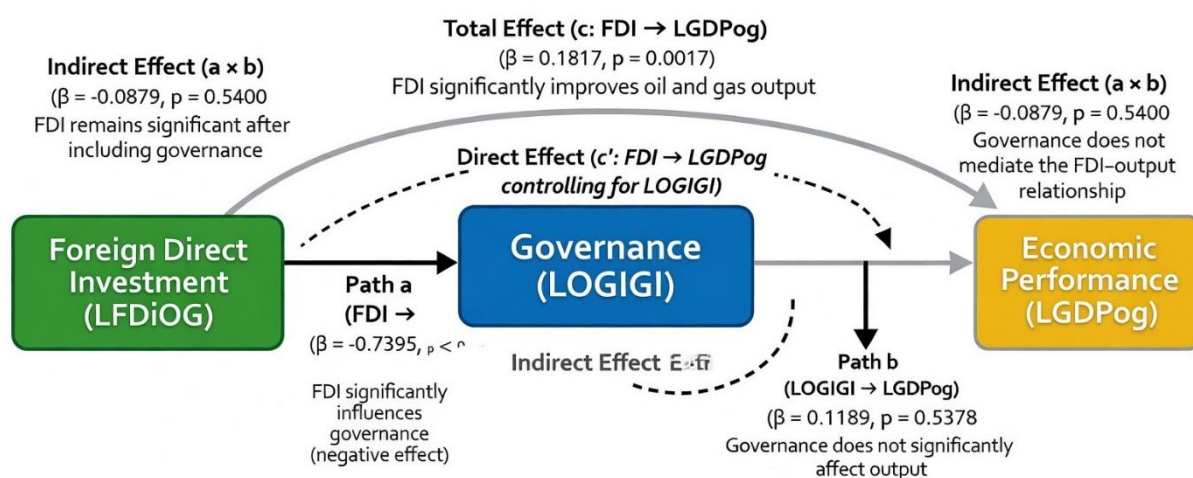


Figure 4: Mediation Analysis of FDI, Governance, and Oil and Gas Economic Performance
Source: Researcher's design based on regression results (2026).

From the diagram, LOGIGI significantly responds to FDI but does not significantly transmit its effect to LGDPog. Solid lines indicate statistically significant relationships; dashed lines indicate non-significant pathways.

Table 7: Summary of ARDL Mediation Test of Governance

Path	Coefficient	Prob. Value	Remarks
Path a (FDI → LOGIGI)	-0.7395	0.0000	FDI significantly influences governance (negative effect)
Path b (LOGIGI → LGDPog)	0.1189	0.5378	Governance does not significantly affect output
Total Effect (c: FDI → LGDPog)	0.1817	0.0017	FDI significantly improves oil and gas output
Direct Effect (c': FDI → LGDPog controlling for LOGIGI)	0.3192	0.0269	FDI remains significant after including governance
Indirect Effect (a × b)	-0.0879	0.5400	Governance does not mediate the FDI–output relationship

Source: Researcher's computation based on regression results (2026).

Since the probability value exceeds the conventional 5 percent significance level, the null hypothesis of no indirect effect cannot be rejected. This indicates that the transmission of FDI

to oil and gas sector output through governance is statistically insignificant. Although foreign direct investment significantly influences governance and also exerts a significant direct effect on oil and gas output, governance does not significantly predict sector performance when included in the dynamic ARDL specification. So, the mediation condition is not satisfied.

The results, therefore, demonstrate that governance does not serve as a transmission channel through which foreign direct investment affects the economic performance of Nigeria's oil and gas industry. Rather, the effect of foreign direct investment operates primarily through a direct mechanism in the estimated model.

Post Estimation Test

Following the estimation of the ARDL models for the direct and mediation specifications, a series of post-estimation diagnostic tests was conducted to ascertain the reliability and stability of the estimated results within the context of Nigeria's oil and gas sector. These diagnostic procedures are essential in time series modelling, particularly within the ARDL framework, to ensure that the underlying classical linear regression assumptions are not violated and that the inferences drawn are statistically valid.

Table 8: Post Estimation Diagnostic Test Results for Stages 1 to 3

Test	Statistic	Value	Df	Probability	Remarks
Total Effect Model					
Breusch–Godfrey Serial Correlation LM Test	F-statistic	1.967	(2, 29)	0.1582	Not rejected
	Obs*R-squared	5.733	2	0.0569	
Breusch–Pagan–Godfrey Heteroskedasticity Test	F-statistic	0.817	(16, 31)	0.6582	Not rejected
	Obs*R-squared	14.236	16	0.5812	
	Scaled explained SS	7.375	16	0.9653	
Ramsey RESET Test	t-statistic	0.767	30	0.4489	Not rejected
	F-statistic	0.589	(1, 30)	0.4489	
	Likelihood ratio	0.933	1	0.3341	
Wald Test	F-statistic	4.707	(2, 31)	0.0164	Rejected
	Chi-square	9.414	2	0.0090	
Direct and Indirect Model					
Breusch–Godfrey Serial Correlation LM Test	F-statistic	0.070	(2, 34)	0.9330	Not rejected
	Obs*R-squared	0.204	2	0.9032	
Breusch–Pagan–Godfrey Heteroskedasticity Test	F-statistic	0.550	(13, 36)	0.8762	Not rejected
	Obs*R-squared	8.284	13	0.8247	
	Scaled explained SS	5.058	13	0.9739	
Ramsey RESET Test	t-statistic	1.310	35	0.1986	Not rejected
	F-statistic	1.717	(1, 35)	0.1986	
	Likelihood ratio	2.394	1	0.1218	

Source: Researcher's computation based on regression results(2026).

Table 8 reports the post-estimation diagnostic results for both the total effect model and the augmented direct and indirect specification. For the total effect model, the Breusch–Godfrey LM test indicates no evidence of serial correlation, as the F-statistic's probability of 0.1582 exceeds the five percent significance level. The Breusch–Pagan–Godfrey test also confirms homoskedasticity, with probability values of 0.6582, 0.5812, and 0.9653, implying constant error variance.

Furthermore, the Ramsey RESET test fails to reject the null hypothesis of correct functional specification, suggesting that the model does not suffer from omitted variable bias or incorrect functional form. Although the Wald test rejects the imposed linear restriction, this simply indicates that the restricted coefficients are jointly significant and should remain freely estimated in the model. Altogether, these results confirm that the total effect model satisfies the classical linear regression assumptions, thereby ensuring reliable statistical inference.

Similarly, the augmented direct and indirect model, which incorporates governance as a mediator, passes all key diagnostic tests. The Breusch-Godfrey LM statistic shows no evidence of autocorrelation, with a probability value of 0.9330. The Breusch-Pagan-Godfrey test confirms homoskedastic residuals, as all reported probability values exceed the five percent threshold. In addition, the Ramsey RESET test indicates correct model specification, with probability values well above conventional levels of significance. These findings suggest that the ARDL estimates are stable and that the inclusion of institutional quality does not introduce econometric distortions. This is consistent with the methodological strength of the ARDL framework, which is widely recognized for producing reliable long-run and short-run estimates in small sample time series analyses when properly specified (Pesaran, Shin, & Smith, 2001; Narayan, 2005).

The implication of these diagnostic results for the study is significant. Since both the total effect and the augmented mediation models satisfy the core econometric assumptions, the conclusion that FDI exerts a significant direct impact on oil and gas economic performance, while governance does not significantly mediate this relationship, is robust and statistically credible. The absence of serial correlation and heteroskedasticity enhances confidence in the estimated standard errors and probability values, thereby strengthening the validity of the policy inferences drawn. In practical terms, the findings suggest that policy initiatives aimed at enhancing sectoral performance should prioritize the efficiency and productivity channels of FDI, while institutional reforms, although important for broader macroeconomic stability, do not appear to serve as a statistically verified transmission mechanism within the estimated framework.

5.0 DISCUSSIONS OF FINDINGS

The study's second objective is to determine the extent to which governance mediates FDI to shape the economic performance of the oil and gas industry in Nigeria and Hypothesis Two states that the FDI-governance mediation process has a significant relationship with the economic performance of Nigeria's oil and gas industry. The ARDL mediation analysis reveals that while FDI exerts a significant positive total effect on sectoral output ($\beta = 0.182$, $p = 0.002$) and a direct positive effect ($\beta = 0.319$, $p = 0.027$), governance does not significantly mediate this relationship. Specifically, FDI negatively affects governance (path a: $\beta = -0.740$, $p < 0.001$), yet governance has no statistically significant influence on sectoral output (economic performance) (path b: $\beta = 0.119$, $p = 0.538$). The resulting indirect effect is

therefore insignificant ($a \times b = -0.088$, $p = 0.540$), confirming that governance does not function as a meaningful or viable channel through which FDI impacts economic performance. The Sobel test corroborates this finding.

The negative effect of FDI on governance may be explained by the enclave nature of FDI in Nigeria's oil and gas industry. IOCs and large-scale foreign investors often operate semi-autonomously, relying on contractual arrangements (e.g. production sharing contracts (PSC), joint venture agreements (JVA), special purpose vehicles (SPV), etc.) that reduce their exposure to local governance structures, regulatory oversight, or fiscal obligations (Ite, 2019; Nwosu & Eze, 2023). Consequently, while FDI boosts production and economic performance through enhanced sectoral output, it does not necessarily improve governance quality or strengthen institutional efficiency.

These findings lend support to the theoretical prediction of the resource-seeking and efficiency-seeking motives of FDI embedded within the location (L) advantage of the OLI paradigm as articulated by Dunning (1993). In this context, oil and gas MNCs focus on operational efficiency and production output, not on reforming or strengthening host-country institutions. It is also consistent with the resource enclave literature, which highlights how resource-intensive FDI can produce economic benefits without inducing institutional development or policy spillovers (Busse & Hefeker, 2007; Blomström & Kokko, 2003). This corroborates the finding of Busse & Hefeker (2007) that political risk/institutional quality matters significantly for attracting FDI: certain indicators (government stability, law and order, bureaucratic quality, and democratic accountability) are particularly important.

Furthermore, the finding that FDI significantly increases economic performance through sectoral output but fails to enhance governance quality or institutional efficiency aligns with the theoretical postulation that a resource enclave occurs when FDI is concentrated in specific extractive sectors that are largely self-contained and disconnected from domestic economic and institutional structures. This finding is consistent with the views of the Enclave FDI hypothesis, which states that FDI in resource-rich sectors, most especially oil and gas, operates in isolated and capital-intensive enclaves (Prebisch, 1950; Baran, 1957 and Furtado, 1965). In such settings, FDI inflows are often capital-intensive, technologically advanced, and managed through expatriate teams or multinational corporate networks, resulting in limited interaction with local governance institutions (Busse & Hefeker, 2007; Letto-Gillies, 2012; Blomström & Kokko, 2003 and Gallagher & Zarsky, 2007).

In the context of Nigeria's oil and gas industry, the Enclave FDI hypothesis aptly explains the reason for oil and gas FDI's increase in production, value efficiency and sectoral output without a commensurate improvement in the quality of governance and institutional strengthening. The enclave nature of the industry provides impetus for the generation of limited and weak spillovers for governance or broader economic development as investors prioritize resource extraction and efficiency over institutional reform or improvement in governance structure (Seers, 1964; Hirschman, 1958; Auty, 1993; Ross, 2012).

Essentially, Nigeria's oil and gas sector exemplifies these characteristics. MNCs operate within vertically integrated concession arrangements where exploration, production, and export activities are largely insulated from national bureaucratic oversight, notwithstanding the implementation of the Petroleum Industry Act (2021), which seeks to eliminate overlapping jurisdictions and regulatory capture that MNCs had historically exploited. Contractual mechanisms such as production sharing agreements and tax holidays further reduce incentives for companies to engage with or strengthen local regulatory frameworks

(Ite, 2019; Nwosu & Eze, 2023). This structural separation of the oil and gas industry from the nation-wide economic matrix explains why FDI contributes positively to production output without a corresponding improvement in governance indicators such as transparency, regulatory compliance, or institutional capacity.

Several empirical studies support this resource enclave dynamic. Blomström and Kokko (2003) note that while FDI can generate economic growth through diverse channels, its institutional and governance spillovers are not automatic; the benefits often remain confined to the enterprise level unless deliberate linkages with domestic institutions are established. Similarly, Busse and Hefeker's (2007) study supports this claim as they emphasize that in countries with weak institutional frameworks, FDI may bypass domestic governance structures entirely, limiting the positive impact of FDI on institutional quality. In the Nigerian context, this aligns with the findings of the previous scholars that the oil sector FDI primarily affects sectoral output (economic performance) and revenue (exports, royalties and taxes), while having a negligible or no effect on governance outcomes such as reduced corruption, enhanced regulatory efficiency or improved public sector capacity (Asiedu, 2012; Ite, 2019 and Nwikina & Ekere, 2024).

Additionally, sectoral features such as high capital intensity, technical complexity, and revenue centralization reinforce the FDI enclave hypothesis established in the previous studies, such as Watts (2004), Ross (2012) and Obi (2014). Large-scale oil projects require specialized machinery, international financing, and expertise, which reduce the necessity for domestic institutional support. Revenues are often remitted or managed at the federal level, further minimizing the interface with local governance structures (World Bank, 2024). This reinforces the observed negative short-run effect of FDI on governance ($\beta = -0.740$, $p < 0.001$) in the current study, as sudden inflows of foreign capital can exacerbate rent-seeking, bureaucratic red tape, regulatory capture, or elite competition, rather than incentivize governance quality or institutional strengthening.

Taking it further, the resource enclave phenomenon also explains why policy and regulatory interventions are critical. Without mechanisms such as local content laws, conditional licensing, or mandatory corporate social responsibility initiatives, the economic gains from FDI may fail to translate into governance improvements (Ite, 2019; van der Ploeg, 2021). For instance, the Nigerian Oil and Gas Industry Content Development Act (2010) and Petroleum Industry Act (2021) aim to encourage domestic capacity-building. However, the current results suggest that these measures have yet to create a measurable mediation pathway between FDI and governance.

The insignificance of governance on output (path b) further explains the lack of mediation.

Although governance quality is theoretically expected to enhance investment efficiency and economic performance through better contract enforcement, reduced corruption, and transparent regulatory processes in alignment with the institutional quality theory (North, 1990; Acemoglu et al., 2019; Alfaro et al., 2010), the empirical evidence indicates that in Nigeria's oil and gas sector, governance improvements are not translating into measurable short-term or medium-term gains in economic performance measured by sectoral output. This could be due to persistent institutional bottlenecks, bureaucratic inertia, and weak enforcement mechanisms, which constrain the ability of governance to amplify the productivity benefits of FDI (Asiedu, 2021; Ite, 2019).

The insignificant indirect effect ($a \times b$) highlights a crucial structural characteristic of the Nigerian oil and gas industry: the departure of FDI inflows from institutional strengthening of

the host-country governance structure. Even though FDI increases production, these inflows do not generate institutional spillovers. This aligns with FDI-governance studies in resource-dependent economies where FDI does not automatically strengthen governance or promote institutional capacity (Busse & Hefeker, 2007; Collier & Goderis, 2007). In contrast, in economies with stronger absorptive capacity, governance may mediate FDI effects effectively (Alfaro et al., 2010, CEMAC, 2024 and Hakim & Budi, 2024). Nigeria's experience underscores the importance of policy design and implementation and regulatory frameworks that intentionally link FDI to institutional development.

From a policy perspective, the implications of these findings is that designing and implementing policies that only attract FDI is insufficient to improve governance quality or leverage institutional channels to enhance the economic performance of Nigeria's oil and gas industry. Policymakers could consider policy thrusts or institutional mechanisms that integrate FDI with governance objectives. For example, local content policies, mandatory corporate social responsibility (CSR) obligations, improved relations with the host communities, fiscal transparency requirements, and capacity-building programs could ensure that FDI supports the governance framework and institutional consolidation in the course of generating economic output (World Bank, 2024; Ite, 2019). Without creating an enabling environment for such linkages to manifest, FDI may continue to operate in enclave-driven arrangements, boosting sectoral output without strengthening governance structures.

Theoretically, these findings extend to the theoretical literature on institutional quality in resource-dependent economies. While the conditional resource curse and institutionalist frameworks suggest that governance mediates the effect of resource-driven FDI on economic performance (Mehlum et al., 2006; Boschini et al., 2013), the current results indicate that in the Nigerian context, this mediation fails to materialize. The sector-specific characteristics of oil and gas may explain why governance does not significantly mediate FDI's impact, highlighting the limits and inefficacy of applying generalized theoretical models without accounting for sectoral and institutional realities (van der Ploeg, 2021). This view partly aligns with the institutional complementarity hypothesis advanced by Aoki (2001) and Hall & Soskice (2001), which argues that economic performance (outcome) is shaped not only by one dominant governance structure or omnibus institution, but by the extent to which institutions interact with other institutions or structural factors, including investment and resource endowments.

In a related sense, the short-run and long-run dynamics, the positive direct effect of FDI on sectoral output confirms that FDI remains a critical driver of production and economic growth in the oil and gas sector. However, the absence of mediation demonstrates that institutional channels or governance frameworks do not automatically capture or instantaneously reinforce these gains. This finding challenges the assumption that FDI inherently improves governance in resource-rich economies, as claimed in the previous studies (Sabir, Rafique & Abbas, 2019 and Yeboua, 2021) and emphasizes the need for deliberate institutional alignment to convert FDI inflows into sustainable economic and governance benefits in Nigeria's most strategic sector (Asiedu, 2021; World Bank, 2024).

Overall, Hypothesis Two is rejected, as governance does not significantly mediate the FDI-economic performance relationship. The findings highlight the necessity for policy interventions that explicitly link FDI with governance improvements, reinforcing the literature's assertion that institutional design and absorptive capacity are critical to leveraging foreign investment for broader economic and developmental gains (Alfaro et al., 2010; Ite, 2019; Busse & Hefeker, 2007). This nuanced understanding contributes to the PhD-level discourse by illustrating that in resource-intensive sectors, direct capital inflows can stimulate

output independently of governance improvements, but sustainable development requires policy mechanisms that ensure investment translates into strengthened institutions.

6.0 CONCLUSION AND POLICY RECOMMENDATIONS

The empirical evidence from the mediation analysis of the FDI-economic performance nexus in Nigeria's oil and gas industry highlights that governance influences FDI conditionally: while strong institutions alone may deter investment due to regulatory costs, their interaction with high sectoral output significantly amplifies FDI inflows, illustrating the importance of economic performance as a complement to institutional quality. Mediation analysis indicates that FDI significantly increases sectoral output, but governance does not mediate this relationship. This demonstrates that foreign investment largely functions as a resource enclave, boosting production without improving institutional quality. Policymakers should design mechanisms that directly link FDI to governance enhancements, such as mandatory local content requirements, structured joint ventures with domestic firms, or conditional compliance with corporate social responsibility and governance standards. Strengthening monitoring and accountability frameworks ensures that foreign capital contributes to long-term institutional development, rather than remaining isolated in enclave production activities. To convert FDI into institutional gains, policies should actively link foreign investment to capacity-building initiatives, including local content requirements, mandatory joint ventures with domestic firms, and contractual obligations for corporate social responsibility that reinforce governance outcomes. By embedding FDI within structured institutional frameworks, Nigeria can leverage foreign capital not only for production but also for strengthening regulatory compliance, administrative capacity, and transparency in the sector.

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